

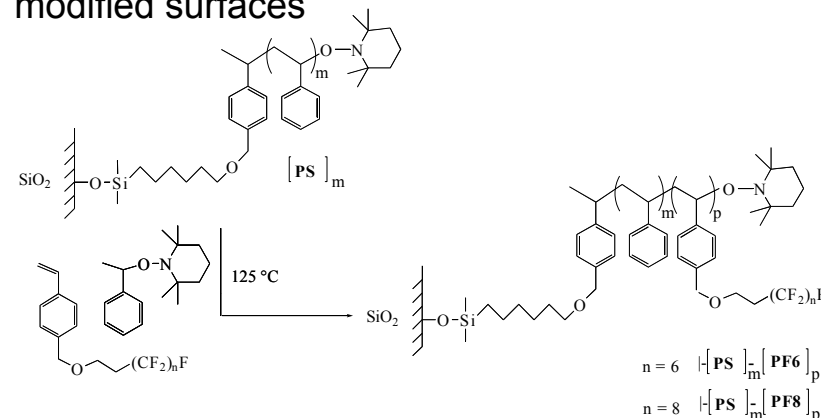
Control of Surface Properties using Fluorinated Brushes

Christopher K. Ober, Cornell University, DMR-0208825

The control and understanding of polymer surfaces is becoming increasingly important for many technologies including microelectronics and biotechnology. The aim of this research is to understand the nature of self-assembling fluorinated surfaces and methods for patterning and control of these surfaces. Here we describe the preparation of ordered fluoropolymer brushes grown from oxide surfaces and studies of molecular structure and orientation using in-situ near edge X-ray absorption fine structure (NEXAFS) studies. These collaborative studies with E.J. Kramer (UCSB) have revealed an important relationship between molecular length and surface organization.

Langmuir, in press (2004)

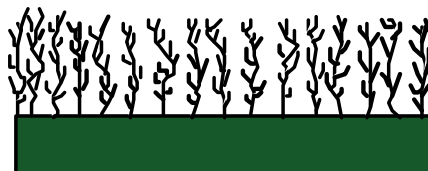
Synthesis of polymer brush modified surfaces



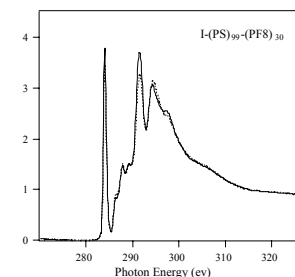
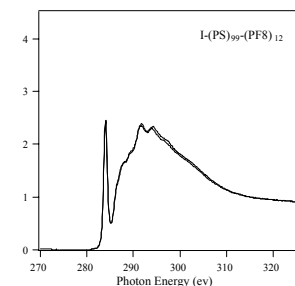
Short brushes (DP~12) show little surface alignment



Longer brushes (DP>20) show strong surface orientation



NEXAFS Studies of Surfaces



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Education:

Under this grant, two students have completed their Ph.D. degrees: Dr. Mingqi Li (Rohm & Haas Micro-electronics) and Dr. Xuefa Li (Advanced Photon Source); two post-doctoral scientists have been trained: Dr. Luisa Andruzzi (OHSU) and Dr. Ken Goto (JSA). Currently, a graduate student: Marvin Paik (2nd year) and a senior post-doctoral scientist: Dr. Fenxiang You are involved in this project as are two undergraduate students: Mr. Nick Wang and Ms. Christina Barnardis. In addition the PI hosted 6 REU students during the summer of 2004 including Nick and Christina, Juan Jose Sanchez-Cortes (UPR-Rio Piedras), Albert Ko (Cornell), Heather Carroll (NCSU) and Kristie Grammatikos (Udel).

Outreach:

- Each fall high school teachers come to Cornell University for a materials chemistry workshop in which the PI is a lecturer. The figure shows the PI presenting to high school teachers and students in 2004.
- The PI was a co-author on a newly revised polymer textbook, “Principles of Polymer Systems”. (See inset)

